



## DIRECTIONS FOR SCIENCE

The Science section of the Grade Eight Proficiency Assessment is made up of three parts, consisting of multiple-choice questions and open-ended questions.

Work as rapidly as you can without sacrificing accuracy. Do not spend too much time puzzling over a question. Answer the easier questions first; then return to the harder ones.

Where necessary, you may use blank spaces in the test booklet for your work.

**YOU MUST RECORD ALL OF YOUR ANSWERS IN THE SEPARATE ANSWER FOLDER.** No credit will be given for anything written in this test booklet. Your response must be in English in order to be scored.

For multiple-choice questions, mark only one answer for each question by filling in the corresponding circle on the answer folder. **MAKE SURE THAT EACH MARK IS HEAVY AND DARK AND COMPLETELY FILLS THE CIRCLE.** If you change an answer, be sure to erase your first choice completely. Incomplete erasures may be read as intended answers.

Respond fully to the open-ended questions in the area provided in the answer folder. Specific directions with each question will refer you to the page in your answer folder where your response is to be written. For each of these questions, provide enough explanation so that the scorer can understand your solution. When asked to explain an answer, you may use words, tables, diagrams, or pictures.

## SCIENCE - PART 1

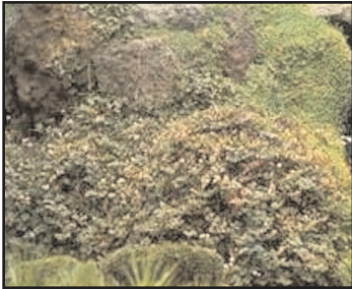
**DIRECTIONS FOR QUESTIONS 1 THROUGH 15:** For each of the questions or incomplete statements below, choose the best of the answer choices given, and fill in the corresponding circle on page 27 of your answer folder.



Glacier Retreating



Barren Land



Lichens/Mosses

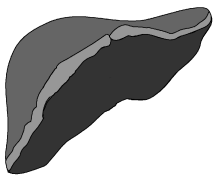


Scrub Growth



Trees

1. Using the pictures shown above, arrange the stages of ecosystem succession in their proper sequence.
- A. Glacier, Barren Land, Mosses, Scrub Growth, Trees
  - B. Barren Land, Glacier, Mosses, Scrub Growth, Trees
  - C. Mosses, Glacier, Barren Land, Scrub Growth, Trees
  - D. Barren Land, Glacier, Scrub Growth, Mosses, Trees



Liver

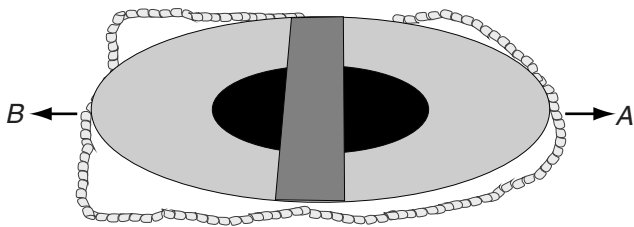


Pancreas



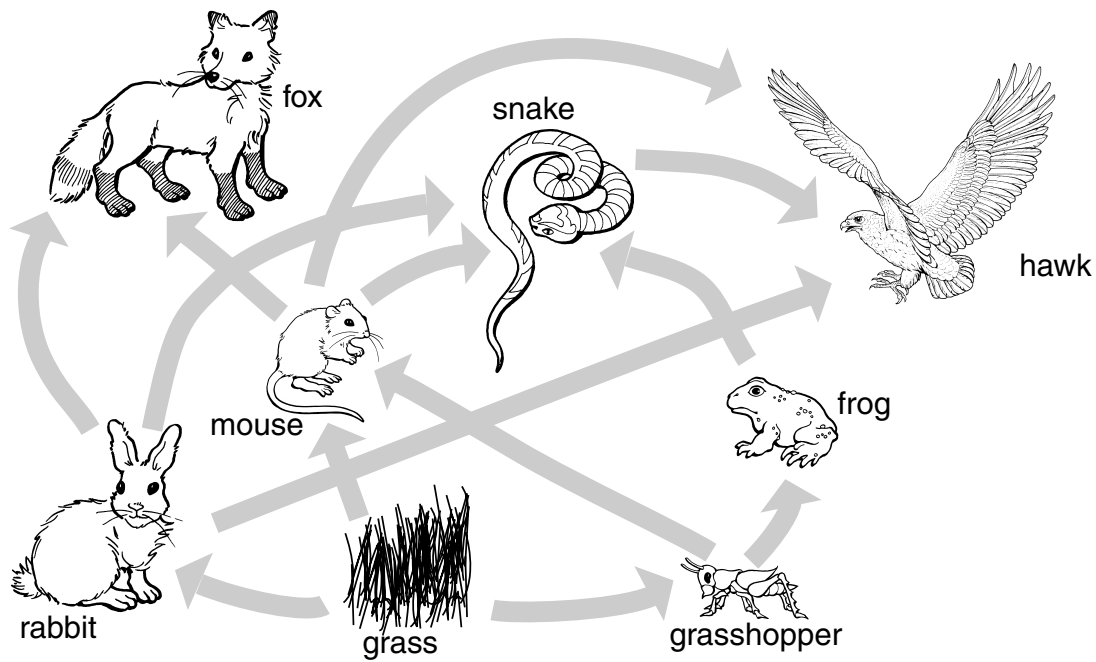
Stomach

2. The objects above function together as components of which of the following?
- A. a web
  - B. a system
  - C. tissue
  - D. an organ



3. A raft is floating on a lake. When Ali dives out of the raft in the direction indicated by arrow *A*, the raft moves in the direction indicated by arrow *B*. Which principle does this illustrate?
- A. Force equals mass times acceleration.
  - B. Energy is neither created nor destroyed; it changes form.
  - C. For every action there is an equal but opposite reaction.
  - D. An object in motion will move at a constant speed in a straight line unless acted upon by an outside force.

4. If the Moon did not rotate at the same rate that it revolved, which of the following would be true?
- A. There would be no more tides.
  - B. We would no longer see eclipses.
  - C. The cycle of the Moon's phases would repeat faster.
  - D. We would be able to see all sides of the Moon.



5. The food web shown above represents the flow of energy to all participants in an ecosystem. Which participant, if eliminated, would destroy the entire food web?
- A. rabbit
  - B. grass
  - C. hawk
  - D. grasshopper



6. A student tests an unknown substance for the following properties and finds the results listed in the table below:

<i>Property</i>	<i>Results</i>
Ductile	Ductile
Malleable	Malleable
Lustre	Shiny
Melting Point	High
Density	13.6 g/cm <sup>3</sup>
Heat Conduction	Good

Given this information, which of the following is the most reasonable conclusion for the student to reach?

- A. The substance is a metallic solid.
- B. The substance is a nonmetallic solid.
- C. The substance is a gas.
- D. The substance is a liquid.

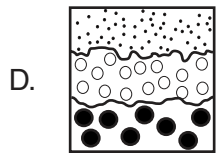
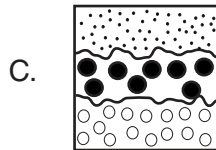
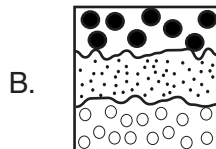
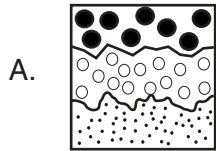
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7. A battery-powered watch with a minute hand and an hour hand tells time because of the transformation of one energy form to another. Which of the sequences below illustrates this transformation?

- A. chemical-electrical-mechanical
- B. chemical-mechanical-electrical
- C. mechanical-chemical-electrical
- D. electrical-chemical-mechanical

8. A chef pours a cup of rice into a pot of boiling water and observes the rice swirling around in the pot. Which of the following explains the cause of this action?

- A. Heat transfer by radiation makes the rice vibrate.
- B. The rice is carried along by conduction.
- C. The chef stirred the pot before the rice was added.
- D. The rice is carried along by convection currents.

9. Which of the following illustrations shows the most common arrangement of sediments as a stream slows down over time?



10. Which of the following is an example of refraction?

- A. A man combs his hair while looking in a mirror.
- B. A woman feels warm wearing black on a bright day.
- C. A man thinks a fish in water is closer than it really is.
- D. A room with brown walls becomes brighter when it is painted white.

11. The environment of a particular species of rabbit is becoming colder over time. Rabbits with which of the following traits will best be able to survive and reproduce?

- A. shorter legs
- B. thicker fur
- C. longer ears
- D. longer whiskers



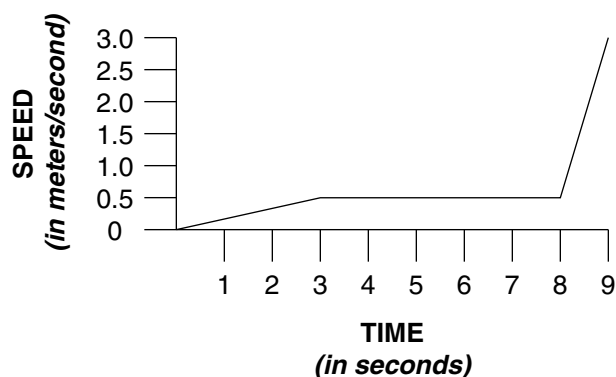
12. Which of the following best explains how minerals get into stream water?

- A. Rainwater dissolves minerals out of the rocks and soil during runoff.
- B. Rainwater that is high in minerals from the atmosphere falls into the stream.
- C. The stream water absorbs minerals from the plants growing in it and along its banks.
- D. When water evaporates from the ocean, it takes minerals with it and redeposits them as rainwater into the stream.

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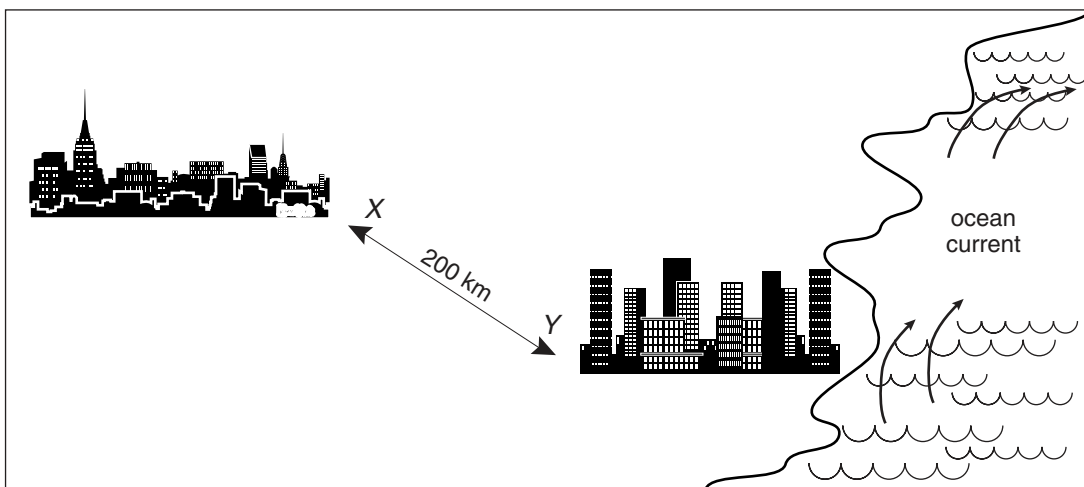
13. Paramecia reproduce both sexually and asexually. One way to see if a given paramecium is the product of sexual or asexual reproduction is to

- A. see whether its genes are identical to those of its parent.
- B. check for traits that are beneficial to its survival.
- C. check for traits that are not beneficial to its survival.
- D. test it for acquired characteristics.



14. The graph shown above provides information about the motion of a bicycle. When is the bicycle's acceleration the greatest?

- A. at 0 seconds only
- B. from 0 – 3 seconds
- C. from 3 – 8 seconds
- D. from 8 – 9 seconds



15. The average temperature of City X is hotter than the average temperature of City Y during the summer, but colder than City Y in the winter. Using the map shown above, what best explains the milder weather in City Y?
- A. Warm winds from the land keep the temperature mild all year long.
  - B. The ocean current warms the air in winter and keeps it cooler in summer.
  - C. The ocean always floods City Y, keeping it near 75°F all year.
  - D. City Y is to the south of City X.





**DIRECTIONS FOR QUESTION 16:** Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You may use words, tables, diagrams, or drawings. Write your answer on page 28 of your answer folder.

16. A classmate measures the temperature of pond water and the soil that surrounds it every hour for a period of five hours on a sunny day. The measurements are shown in the chart below.

Time (Hours)	0	1	2	3	4	5
Water Temperature (°C)	16	17	18	19	21	23
Soil Temperature (°C)	16	16	19	21	23	26

The next day, at a nearby lake that has a shore of sandstone, you measure the temperature of the sandstone and water at 7 a.m. You find that both have a temperature of 13° C.

If it is sunny all day:

- What do the results of the experiment at the pond predict about the temperature of the sandstone and the lake water at noon?
- Explain your answer.
- Explain why your prediction, based on the data, might be incorrect.





**SCIENCE - PART 2**

**DIRECTIONS FOR QUESTIONS 17 THROUGH 31:** For each of the questions or incomplete statements below, choose the best of the answer choices given, and fill in the corresponding circle on page 29 of your answer folder.

17. The greatest differences in structure occur in organisms of different

A. orders.  
B. phyla.  
C. species.  
D. families.

- 
18. A 1,000-year-old stone statue, in perfect condition, was moved from the desert to a park in New Jersey. After one year, its surface began to crumble. What is the most likely cause of the crumbling?

A. The statue was very old and the stone started to decay.  
B. The statue was damaged by rain water.  
C. The statue was damaged during the move.  
D. The statue was damaged by sunlight.

19. During a space walk, an astronaut lets go of a tool, causing it to float away and bounce off the side of the space shuttle. Why does the astronaut see the tool hit the shuttle but not hear it?

A. Light waves cannot travel through a vacuum. However, sound waves can.  
B. Sound waves cannot travel through a vacuum. However, light waves can.  
C. Neither sound nor light waves can travel through a vacuum.  
D. Both sound and light waves can travel through a vacuum.

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20. A scale has been created that measures the magnitude of total energy released in an earthquake. This scale is known as the

A. pH scale.  
B. Celsius scale.  
C. Mohs scale.  
D. Richter scale.

21. The system of plant and animal classification developed over two hundred years ago and still used today is based on
- A. acquired similarities.
  - B. structural similarities.
  - C. biochemical similarities.
  - D. environmental similarities.

- 
22. Which of the following is true about the planets in the solar system?
- A. All planets complete one revolution about every 365 days.
  - B. All planets have one moon.
  - C. All planets have an elliptical orbit.
  - D. All planets have the same surface temperature.

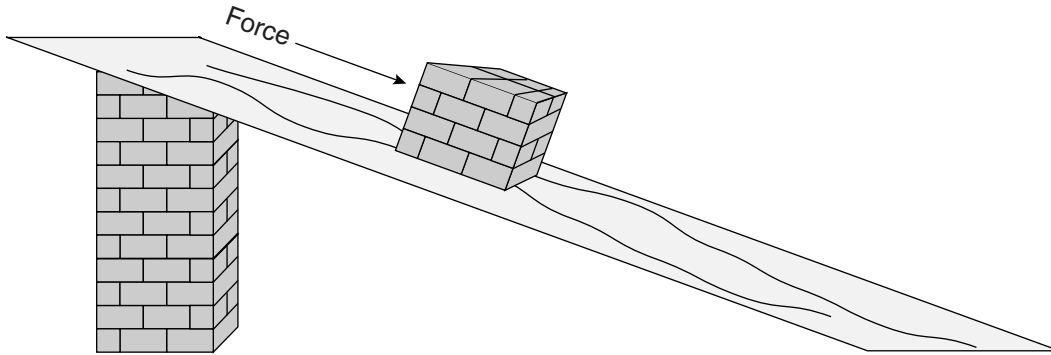
23. Sonar is a tool that uses sound waves to measure the depth of the ocean. Sonar bounces sound waves off of the ocean's floor. The time taken for the sound wave to leave a ship on the ocean's surface and return from the ocean's floor can be used to determine the depth of the ocean.

The chart below shows the sonar readings from four different ships moving over the surface of the ocean during a 1-hour period.

SHIP	SONAR READINGS			
	1st	2nd	3rd	4th
A	.10 sec	.15 sec	.17 sec	.21 sec
B	.17 sec	.21 sec	.18 sec	.15 sec
C	.21 sec	.17 sec	.15 sec	.10 sec
D	.11 sec	.08 sec	.15 sec	.09 sec

Which ship moved continuously from shallow to deeper water?

- A. Ship A
- B. Ship B
- C. Ship C
- D. Ship D

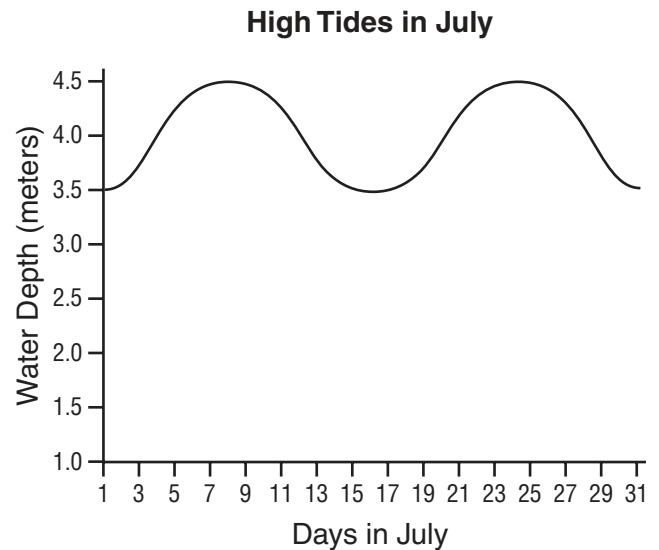


24. What variable can be changed to increase the acceleration of this stack of bricks?

- A. decrease the force
- B. increase the mass
- C. decrease the mass
- D. increase the friction

25. To find the volume of a few small marbles, a student will need which of the following scientific tools?

- A. a balance and a centimeter ruler
- B. a spring scale and a calculator
- C. a graduated cylinder and water
- D. a microscope and a micron ruler



26. The graph above shows the high tide levels for each day in July. On what day would you predict a full moon occurring?

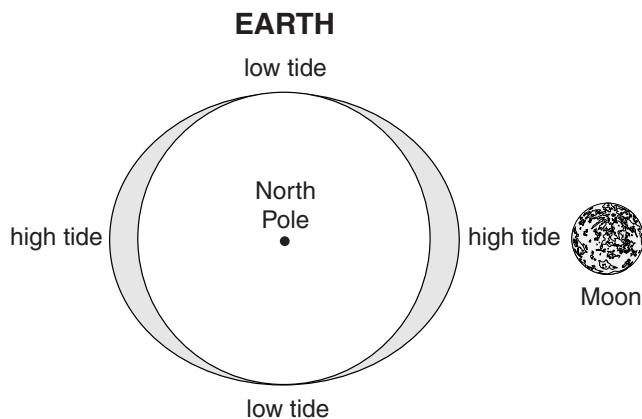
- A. July 3
- B. July 8
- C. July 21
- D. July 29

27. A forest of trees with white bark is home to a species of gray moth and to birds which prey on them. Pollution made the bark of the trees go black. Several years later most of the moths found had wings that were

- A. shorter.
- B. longer.
- C. lighter.
- D. darker.

29. Organisms that require oxygen must transfer molecules of oxygen from their environment to their cells. In humans, which two systems are directly involved in the transfer of oxygen from the environment to their cells?

- A. circulatory and nervous
- B. respiratory and digestive
- C. digestive and nervous
- D. respiratory and circulatory



28. The diagram shows the pattern of tides on Earth. They are caused by

- A. Earth's gravity and the Moon's rotations on its axis.
- B. Earth's rotations on its axis and the Moon's gravity.
- C. Earth's revolutions around the Sun and the Moon's gravity.
- D. Earth's gravity and the Moon's revolutions around the Earth.

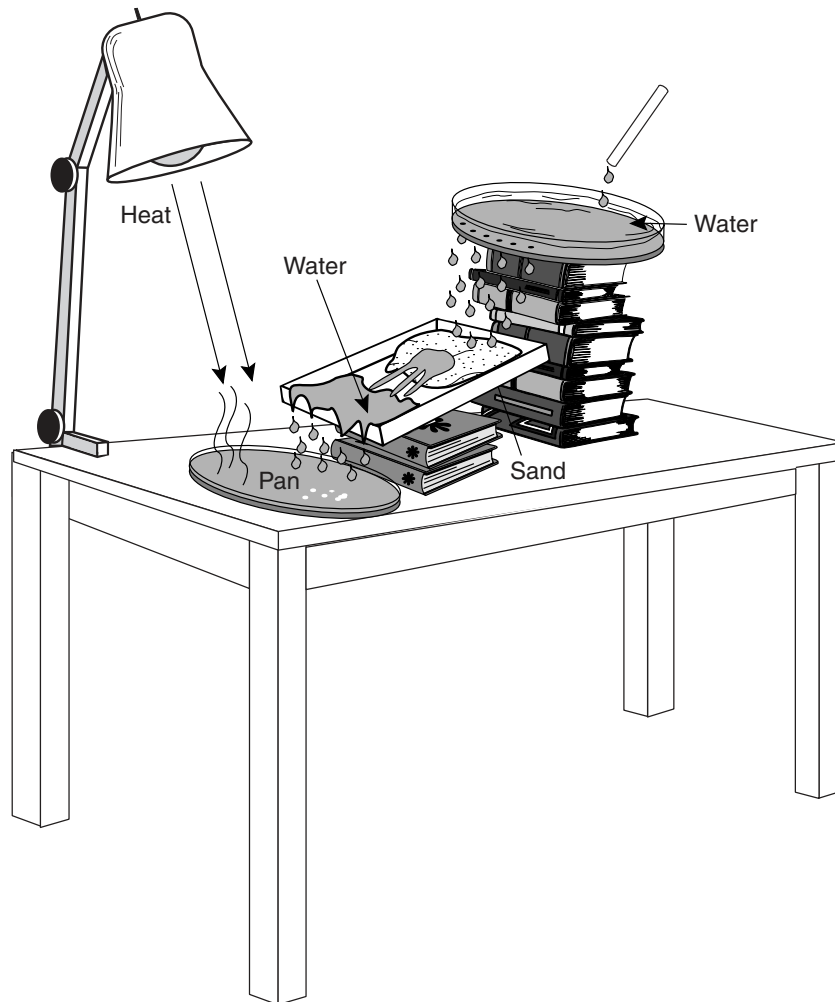
30. The smallest particle of any element that still has the properties of that element is called

- A. an atom.
- B. a compound.
- C. a solution.
- D. a mixture.

31. Plants and animals require large amounts of water in order to survive. Although vast numbers of plants and animals have lived throughout time, the water in our environment has not been used up. Which of the following explains why?

- A. Vast quantities of water are created by lightning in clouds.
- B. Organisms return water to the environment after they use it.
- C. Organisms combine hydrogen and oxygen to make their own water.
- D. Water continually flows from the center of the earth.

**DIRECTIONS FOR QUESTION 32:** Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You may use words, tables, diagrams, or drawings. Write your answer on page 30 of your answer folder.



32. The above apparatus models the workings of the water cycle, but one step in the cycle is left out.

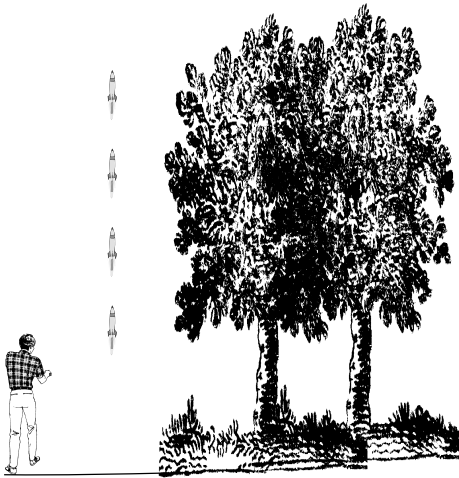
- Identify the missing step.
- Describe what happens during that step in the water cycle.
- Explain why the cycle would cease to exist if this step were left out in real life.





**SCIENCE - PART 3**

**DIRECTIONS FOR QUESTIONS 33 THROUGH 47:** For each of the questions or incomplete statements below, choose the best of the answer choices given, and fill in the corresponding circle on page 31 of your answer folder.



33. A model rocket is launched straight upward from the surface of the Earth at a speed of 50 m/sec. At its highest point above ground, its velocity in m/sec will be

A. 0  
B. 10  
C. 20  
D. 50

34. Which of the following pieces of equipment would be most useful for a scientist studying the behavior of a pack of wolves in the wild?

A. magnifying glass  
B. microscope  
C. binoculars  
D. radio telescope

35. Which of the following statements correctly describes forces that uplift and wear down the Earth's surface?

A. Erosion builds up mountains, which are then flattened by volcanoes.  
B. Volcanic activity creates mountains, which are then worn down by erosion.  
C. Volcanic activity creates mountains, which are sharpened over time by glaciation.  
D. Weathering lifts soil out of the sea, which is then distributed to rivers by erosion.

36. You need to dissolve 1 g of salt in 150 mL of water. After dissolving the salt in the water, you realize that you mistakenly used 175 mL of water. What can you do to correct this?

A. Pour out 25 mL of water.  
B. Filter the water using a funnel and filter paper.  
C. Wait for the salt to settle out of the solution.  
D. Boil the water until only 150 mL remains.

37. The distance from Earth to the Moon is approximately 384,000 km. If the distance were to increase to 500,000 km, which statement about the tides would be correct?

- A. There would be no high tides or low tides.
- B. The difference between high and low tide would be much greater.
- C. The difference between high and low tide would be much less.
- D. The difference between high and low tide would not change.

38. When succession takes place in a marsh, which of the following is likely to happen?

- A. Water level rises and a lake is formed.
- B. Bigger plants appear as water levels rise in the marsh.
- C. Water gradually disappears and the area becomes dry land.
- D. There are fewer trees to take in carbon dioxide and produce oxygen.

39. A tight metal lid on a glass jar of jelly may loosen when held under a flow of hot water. The hot water causes the

- A. metal lid to contract.
- B. metal lid to expand more than the glass jar expands.
- C. glass jar to contract.
- D. glass jar to expand more than the metal lid expands.

40.

41. Why does the tail of a comet always point away from the Sun?

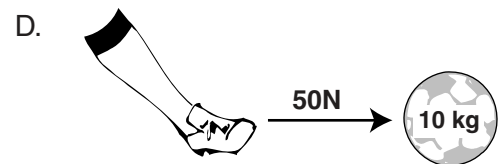
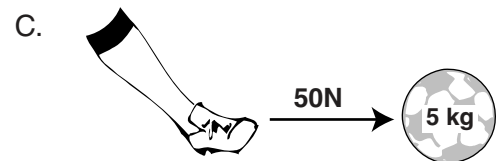
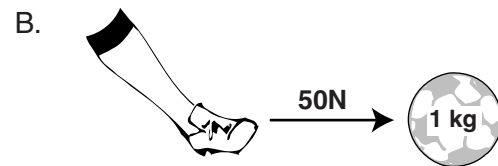
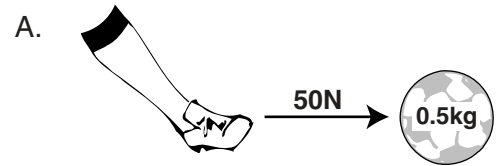
- A. The gravity of the planets pulls the comet's tail away.
- B. Explosions and the tearing away of ice particles happen on the side of the comet away from the Sun.
- C. The solar wind pushes the ionized gasses away.
- D. Comets spin so rapidly that particles are thrown off by centrifugal force away from the Sun.

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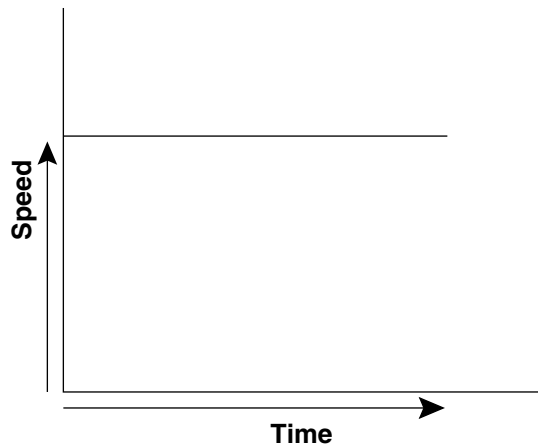
42. You are given a solution of sugar and sand in water. Your task is to separate the sugar from the sand. Which of the following experimental designs would you choose?

- A. Filter out the sand and evaporate the water.
- B. Filter out the sugar.
- C. Let the solution stand for several minutes to let the sugar and sand settle out.
- D. Use a magnet to separate the sugar from the sand.

43. The illustrations show soccer balls of different masses being kicked with equal force. Which ball will have the greatest acceleration?

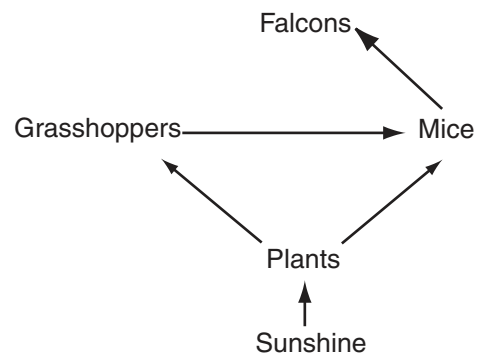


44. Why do the faster-running deer tend to be found more frequently in a deer population?
- A. Slow-running deer reproduce more slowly.
  - B. Slow-running deer are unable to compete for food.
  - C. Fast-running deer have more fawns per doe.
  - D. Fast-running deer are able to escape predators.



45. Which of the following statements best describes the relationship between speed and time shown in the graph above?
- A. Speed remains constant over time.
  - B. Speed increases over time.
  - C. Speed decreases over time.
  - D. There is no relationship between speed and time.

46.



47. What can you conclude about animals, based on the food web shown above?
- A. They require only sunlight to survive.
  - B. They can make their own food.
  - C. They do not eat plants.
  - D. They must eat other organisms to obtain energy.

**DIRECTIONS FOR QUESTION 48:** Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You may use words, tables, diagrams, or drawings. Write your answer on page 32 of your answer folder.



48. The only predator of the rabbit population in a meadow ecosystem has been removed.

- Predict what will happen to both the rabbit and the plant populations in the ecosystem in the first 6 months and after 5 years.
- Explain the reasons for your predictions.



